QP Code: 22/PT/11/IX

POST-GRADUATE COURSE

Term End Examination — June, 2022/December, 2022

ECONOMICS

Paper-IX : BASIC ECONOMETRICS

Time : 2 hours] [Full Marks : 50

Weightage of Marks : 80%

Special credit will be given for precise and correct answer. Marks will be deducted for spelling mistakes, untidiness and illegible handwriting. The figures in the margin indicate full marks.

Use of scientific calculator is permitted

This question paper requires students to have scientific calculator. Also, at the time of exam, students should be provided with the following tables :

1. Table for *t*-distribution (Table IV, Page 140 of SLM)
2. Table for *F*-distribution (Table V, Page 141-144 of SLM)
3. DW table (Table VI, Page 145 of SLM)

1. Answer any *four* of the following questions : $2\frac{1}{2} \times 4 = 10$

   a) What is meant by BLUE of an estimate ?

   b) What do you mean by multicollinearity ?

   c) State the Goldfield-Quandt test for detecting the problem of heteroscedasticity.

   d) Briefly discuss the major goals of econometrics.

   e) Find the value of R^2 from the following data :

   $$\sum_{i=1}^{n} x_i y_i = 300 \quad ; \quad \sum_{i=1}^{n} x_i^2 = 60 \quad ; \quad \sum_{i=1}^{n} y_i^2 = 1800 \quad ; \quad n = 20$$

   where $x_i = X_i - \overline{X}$ and $y_i = Y_i - \overline{Y}$.

f) A sample of 20 observations corresponding to the regression model $Y_i = \alpha + \beta X_i + u_i$ where u_i is normally distributed with mean zero and unknown variance σ_u^2 gives the following data :

$$\sum_{i=1}^{n} Y_i = 21{\cdot}9 \; ; \; \sum_{i=1}^{n} \left(Y_i - \overline{Y}\right)^2 = 86{\cdot}9 \; ; \; \sum_{i=1}^{n} X_i = 186{\cdot}2 \; ;$$

$$\sum_{i=1}^{n} \left(X_i - \overline{X}\right)\left(Y_i - \overline{Y}\right) = 106{\cdot}4 \; ; \; \sum_{i=1}^{n} \left(X_i - \overline{X}\right)^2 = 215{\cdot}4 \; ; \; n = 20$$

Obtain the estimated line of regression.

2. Answer any *four* of the following questions : $5 \times 4 = 20$

a) What is econometrics ? How is it different from mathematical economics and statistics ?

b) Show that the regression intercept ($\hat{\alpha}$) is linear.

c) What do you mean by point estimation and interval estimation ?

d) What are the major consequences of multicollinearity in a linear regression model ?

e) What are the consequences of heteroscedasticity problem ?

f) What are the major sources of the problem of autocorrelation ?

3. Answer any *two* of the following questions : $10 \times 2 = 20$

a) State and prove the Gauss Markov Least Square Theorem with reference to $\hat{\beta}$ in CLRM.

b) Consider the model : $Y_t = \alpha + \beta X_t + u_t$ with the following observations on Y and X.

X :	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Y :	2	1	2	3	3	2	5	6	11	10	12	15	10	11	12

Test for autocorrelation.

c) The following table shows twelve pairs of observations on X (price) and Y (quantity supplied).

No. of observation (n)	*Quantity (in tons) (Y)*	*Price (in '00 rupees) (X)*
1	69	9
2	76	12
3	52	6
4	56	10
5	57	9
6	77	10
7	58	7
8	55	8
9	67	12
10	53	6
11	72	11
12	64	8

Assuming a linear supply function, estimate the supply function. Comment on the values of the estimated coefficients ($\hat{\alpha}$ and $\hat{\beta}$) on the basis of economic theory.

d) A researcher using time series data for the period 1954-65, estimated the following consumption function $\hat{C}$ = 3 + 0·9272 X.

The following table includes the data used and the residual errors :

Year	*Consumption (C)*	*Income (X)*	e_i
1954	236	257	0·52
1955	254	275	1·82
1956	267	293	1·87
1957	281	309	2·71
1958	290	319	2·99
1959	311	337	1·30
1960	325	350	3·25
1961	335	364	0·26
1962	355	385	0·78
1963	375	405	2·23
1964	401	437	1·45
1965	431	469	1·14

i) Test for heteroscedasticity, using Spearman's rank correlation coefficient.

ii) Outline the corrective solution which you would adopt if heteroscedasticity is found significant.